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APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
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10/530,783

09/28/2005

Richard P. Anderson

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7590

06/19/2008

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EXAMINER

FOGARTY, CAITLIN ANNE

ART UNIT

PAPER NUMBER

1793

MAIL DATE

DELIVERY MODE

06/19/2008

PAPER

Please find below and/or attached an Office communication concerning this application or proceeding.

The time period for reply, if any, is set in the attached communication.

Office Action Summary	Application No. 10/530,783	Applicant(s) ANDERSON ET AL.	
	Examiner CAITLIN FOGARTY	Art Unit 1793	

-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) OR THIRTY (30) DAYS, WHICHEVER IS LONGER, FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

Status

- 1) ☒ Responsive to communication(s) filed on 10 March 2008.
- 2a) ☐ This action is **FINAL**. 2b) ☒ This action is non-final.
- 3) ☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

Disposition of Claims

- 4) ☒ Claim(s) 1-25 is/are pending in the application.
- 4a) Of the above claim(s) _____ is/are withdrawn from consideration.
- 5) ☐ Claim(s) _____ is/are allowed.
- 6) ☒ Claim(s) 1-25 is/are rejected.
- 7) ☐ Claim(s) _____ is/are objected to.
- 8) ☐ Claim(s) _____ are subject to restriction and/or election requirement.

Application Papers

- 9) ☐ The specification is objected to by the Examiner.
- 10) ☒ The drawing(s) filed on 07 April 2005 is/are: a) ☒ accepted or b) ☐ objected to by the Examiner.
Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).
Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).
- 11) ☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

Priority under 35 U.S.C. § 119

- 12) ☐ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).
- a) ☐ All b) ☐ Some * c) ☐ None of:
1. ☐ Certified copies of the priority documents have been received.
 2. ☐ Certified copies of the priority documents have been received in Application No. _____.
 3. ☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).

* See the attached detailed Office action for a list of the certified copies not received.

Attachment(s)

- | | |
|--|---|
| 1) <input type="checkbox"/> Notice of References Cited (PTO-892) | 4) <input type="checkbox"/> Interview Summary (PTO-413) |
| 2) <input type="checkbox"/> Notice of Draftsperson's Patent Drawing Review (PTO-948) | Paper No(s)/Mail Date. _____ |
| 3) <input type="checkbox"/> Information Disclosure Statement(s) (PTO/SB/08) | 5) <input type="checkbox"/> Notice of Informal Patent Application |
| Paper No(s)/Mail Date _____ | 6) <input type="checkbox"/> Other: _____ |

DETAILED ACTION

Status of Claims

1. Claims 1 – 25 are pending where claim 25 has been amended. Claims 26 and 27 have been cancelled.

Status of Previous Rejections

2. The claim objection has been withdrawn in view of the amendment filed on March 10, 2008.
3. The following rejections have been withdrawn:
 - Claims 1 – 7, 18, and 26 – 27 under 35 U.S.C. 102(b) as being anticipated by Armstrong et al. (US 5,958,106).
 - Claim 17 under 35 U.S.C. 103(a) as being unpatentable over Armstrong et al.-A (US 5,958,106) in view of Okudaira et al. (US 4,902,341) and further in view of Armstrong et al.-B (US 5,779,761).
4. The following rejections have been maintained:
 - Claim 8 under 35 U.S.C. 103(a) as being unpatentable over Armstrong et al. (US 5,958,106).
 - Claims 9 – 16 and 19 – 25 under 35 U.S.C. 103(a) as being unpatentable over Armstrong et al. (US 5,958,106) in view of Okudaira et al. (US 4,902,341).
 - The nonstatutory obviousness-type double patenting rejection of claims 1 – 8, 10, 18 – 23, and 26 – 27 as being unpatentable over claims 1 – 5, 7 – 11, 13 – 16, 19 – 20, and 24 of U.S. Patent No. 5,779,761.

- The nonstatutory obviousness-type double patenting rejection of claims 1 – 3, 6, 18, 21, 23, 26, and 27 over claims 1 and 28 of copending Application No. 10/530,775.

Claim Rejections - 35 USC § 103

5. The text of those sections of Title 35, U.S. Code not included in this action can be found in a prior Office action.

6. Claims 1 – 9, 13, and 18 are rejected under 35 U.S.C. 103(a) as being unpatentable over Armstrong et al. US 5,958,106 (hereafter US '106).

With respect to instant claim 1, the abstract, col. 1 lines 13 – 24, col. 3 lines 56 – 61, col. 4 lines 14 – 23, and claim 1 of US '106 disclose a method of producing an elemental material or an alloy thereof from a halide of the elemental material or halide mixtures. The halide or mixtures thereof are contacted with a stream of liquid alkali metal or alkaline earth metal (reducing metals) or mixtures thereof in sufficient quantity to convert the halide to the non-metal or the metal or alloy for which the reduction of the halide to the element is exothermic. The products leaving the reaction zone are quenched (rapidly cooled) to avoid sintering and the particulate reaction products are removed from the product stream.

US '106 differs from instant claim 1 because it does not teach that the liquid phase of a reducing metal is present in less than or equal to the amount needed to reduce the halide vapor to the elemental material or alloy. However, the use of a stoichiometric amount of reactants in US '106 is still a valid teaching with a corresponding omission of the benefits of using an excess amount of reducing agent. By using a stoichiometric amount of reactants in the method of US '106 the benefit of

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maintaining the temperature of the reactants at a temperature lower than the sintering temperature of the produced non-metal or metal or alloy (abstract) would be forfeited, but the reaction would still occur. It would have been obvious to one of ordinary skill in the art to use a stoichiometric amount of reactants in the method of US '106 because it is common practice and the reaction would still occur as discussed above.

In regards to instant claim 2, col. 1 lines 13 – 24 of US '106 teach that the elemental material or alloy may be Ti, Al, Sb, Be, B, Ga, Mo, Nb, Ta, V, Zr, Ir, Os, Re, or U.

Regarding instant claims 3 and 6, col. 3 lines 17 – 28 of US '106 disclose that the reducing metal may be an alkali metal or an alkaline earth metal.

With respect to instant claims 4 and 7, claim 2 of Armstrong et al. discloses that the liquid alkali metal is Na, K, or mixtures thereof and the liquid alkaline earth metal is Mg, Ca, Ba, or mixtures thereof.

In regards to instant claim 5, col. 3 lines 56 – 61 of US '106 teach the method wherein the elemental material includes titanium and the Na is flowing.

Regarding instant claim 8, col. 1 lines 33-38 of US '106 disclose that both magnesium and sodium reduction of titanium tetrachloride have proven to be commercial methods for producing titanium metal. Therefore, it would have been obvious to one of ordinary skill in the art to perform the method of the instant invention wherein the elemental material includes titanium and the Mg is flowing.

With respect to instant claim 9, col. 3 line 29 to col. 4 line 17 and Table 1 of US '106 teach that the method may be used to produce any of the non-metals or metals or

alloys of a predetermined composition selected from the list set forth in Table 1.

Therefore, it would have been obvious to one of ordinary skill in the art to make a desired alloy such as the alloys taught in instant claim 9 from the non-metal and metal vapor chlorides listed in Table 1.

Regarding instant claim 13, col. 4 lines 24 – 33 of US '106 teach that the temperature of the particulate elemental material or alloy is maintained at or below the boiling point of the halide salt of the reducing metal because the particulate elemental material remains in the solid state.

With respect to instant claim 18, the abstract, col. 1 lines 13 – 24, col. 3 lines 56 – 61, col. 4 lines 14 – 23, and claim 1 of US '106 teach a method of producing a metal element of an alloy thereof in an exothermic reaction between the chloride of the metal element or the chlorides of the constituents of the alloy and a reducing metal of an alkali metal or an alkali earth metal or mixtures thereof. The method comprises introducing the vapor chloride or vapor chlorides of the metal or alloy to be produced into the liquid phase of the reducing metal to produce particulate reaction products of the metal element or alloy thereof and particulate chloride salt of the reducing metal and heat. Then the reaction products are cooled in order to prevent sintering of the particulate metal element or alloy, and the cooled particulate metal element or alloy is separated from the chloride salt of the reducing metal.

US '106 differs from instant claim 18 because it does not specifically teach that the vapor chloride or vapor chlorides of the metal or alloy to be produced are introduced in an amount equal to or less than the stoichiometric amount needed to react with the

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reducing metal to produce particulate reaction products of the metal element or alloy.

However, the use of a stoichiometric amount of reactants in US '106 is still a valid teaching with a corresponding omission of the benefits of using an excess amount of reducing agent. By using a stoichiometric amount of reactants in the method of US '106 the benefit of maintaining the temperature of the reactants at a temperature lower than the sintering temperature of the produced non-metal or metal or alloy (abstract) would be forfeited, but the reaction would still occur. It would have been obvious to one of ordinary skill in the art to use a stoichiometric amount of reactants in the method of US '106 because it is common practice and the reaction would still occur as discussed above.

7. Claims 10 – 12, 14 – 17, and 19 – 25 are rejected under 35 U.S.C. 103(a) as being unpatentable over Armstrong et al. US 5,958,106 (hereafter US '106) as applied to claims 1, 2, and 18 above, and further in view of Okudaira et al. US 4,902,341. (hereafter US '341).

US '106 is applied to instant claims 1, 2, and 18 as discussed above in the 35 U.S.C. 103(a) rejection.

US '106 differs from instant claim 10 because it does not specifically teach that the particulate reaction products are cooled with an inert sweep gas. However, col. 2 line 62 to col. 3 line 18, col. 5 lines 7 – 20, and col. 6 lines 53 – 61 of US '341 teach a method for producing a titanium alloy (elemental material) by the reduction of titanium tetrachloride (halide of an elemental material) and alloy components with a reducing metal agent. The method of US '341 includes a step of cooling the reaction product

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with an inert sweep gas such as argon. Although the method of US '341 teaches the reduction of the halide of an elemental material in the molten state as opposed to the vapor phase as taught in US '106, the reduction of the halide of an elemental material with a reducing agent is an exothermic reaction in both the method of US '341 and the method of US '106 and therefore the products of both methods require cooling. It would have been obvious to one of ordinary skill in the art to incorporate the method step of cooling the reaction products with an inert gas as taught in US '341 with the method of US '106 because both methods include exothermic reactions between a halide of an elemental material and a reducing metal that require cooling the final product. The cooling step of US '341 is an alternate method for cooling the reaction products of US '106 that achieves the same results.

US '106 differs from instant claim 11 and 12 because it does not specifically teach the method where the reducing metal is either Na or Mg, the inert sweep gas is Ar and the alloy is Ti-6% by weight Al-4% by weight V. However, col. 5 lines 7 – 20 and Example 1 of US '341 disclose that the elemental material may be an alloy with the composition of Ti-6% by weight Al-4% by weight V and the product is cooled with an inert sweep gas such as argon. Furthermore, col. 4 lines 49 – 54 of US '341 teach that the reducing metal can either be magnesium or sodium.

US '106 differs from instant claims 14 – 16 because it does not teach that the inert sweep gas flows either countercurrently to or co-currently with the particulate reaction products or that the excess vapor halide present is separated from the reaction products before the separation of the particulate halide salt of the reducing metal from

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the elemental material or alloy. However, Fig. 1 of US '341 teaches that the inert gas, which flows in through pipe 3, flows co-currently with the reaction product because the reaction product is removed through pipe 13. The sweep gas is separated from the reaction product as taught in col. 3 lines 14 – 18. US '341 does not specifically teach that the inert sweep gas may also flow countercurrently to the reaction product.

However, it would have been obvious to one of ordinary skill in the art to situate the argon gas input so that the argon flows either countercurrently or co-currently because the reaction product is cooled regardless of which way the inert sweep gas flows.

However, it would have been obvious to one of ordinary skill in the art that if the inert gas flowed countercurrently to the reaction product outlet, the excess vapor halide of the elemental material or any other byproducts would be removed through the outlet of the sweep gas. The halide salt of the reducing metal is separated from the elemental material or alloy as disclosed in col. 3 lines 14 – 18.

In regards to instant claim 17, col. 4 lines 11 – 42 of US '106 teach that the cooled particulate reaction products are contacted with a water-alcohol wash to separate the halide salt of the reducing metal from the particulate elemental material or alloy.

US '106 differs from instant claims 19, 20, and 25 because it does not teach that the reaction products are cooled by contact with flowing gas cooler than the reaction products or that the cooling gas separates any chloride vapor from the reaction products. However, col. 2 line 62 to col. 3 line 18, col. 5 lines 7 – 20, and col. 6 lines 53 – 61 of US '341 teach a method for producing a titanium alloy (elemental material) by

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the reduction of titanium tetrachloride (halide of an elemental material) and alloy components with a reducing metal agent. The method of US '341 includes a step of cooling the reaction product with an inert sweep gas such as argon. The flowing gas of US '341 is cooler than the reaction products because its purpose is to cool the products. Also, the flow of the inert sweep gas separates any chloride vapor from the reaction products as taught in col. 3 lines 14 - 18. Although the method of US '341 teaches the reduction of the halide of an elemental material in the molten state as opposed to the vapor phase as taught in US '106, the reduction of the halide of an elemental material with a reducing agent is an exothermic reaction in both the method of US '341 and the method of US '106 and therefore the products of both methods require cooling. It would have been obvious to one of ordinary skill in the art to incorporate the method step of cooling the reaction products with an inert gas as taught in US '341 with the method of US '106 because both methods include exothermic reactions between a halide of an elemental material and a reducing metal that require cooling the final product. The cooling step of US '341 is an alternate method for cooling the reaction products of US '106 that achieves the same results.

With respect to instant claims 21 – 23, col. 1 lines 13 – 24, col. 3 lines 16 – 55, Table 1, and claims 1 and 2 of US '106 disclose that the metal element may be Ti or alloys thereof or Zr or alloys thereof and the reducing metal is Na or an alkaline earth metal such as Mg.

US '106 differs from instant claim 24 because it does not specifically teach that the elemental alloy includes Ti and V and Al. However, Example 1 of US '341 teaches that the elemental material may be an alloy of Ti, V, and Al.

Double Patenting

8. The nonstatutory double patenting rejection is based on a judicially created doctrine grounded in public policy (a policy reflected in the statute) so as to prevent the unjustified or improper timewise extension of the "right to exclude" granted by a patent and to prevent possible harassment by multiple assignees. A nonstatutory obviousness-type double patenting rejection is appropriate where the conflicting claims are not identical, but at least one examined application claim is not patentably distinct from the reference claim(s) because the examined application claim is either anticipated by, or would have been obvious over, the reference claim(s). See, e.g., *In re Berg*, 140 F.3d 1428, 46 USPQ2d 1226 (Fed. Cir. 1998); *In re Goodman*, 11 F.3d 1046, 29 USPQ2d 2010 (Fed. Cir. 1993); *In re Longi*, 759 F.2d 887, 225 USPQ 645 (Fed. Cir. 1985); *In re Van Ornum*, 686 F.2d 937, 214 USPQ 761 (CCPA 1982); *In re Vogel*, 422 F.2d 438, 164 USPQ 619 (CCPA 1970); and *In re Thorington*, 418 F.2d 528, 163 USPQ 644 (CCPA 1969).

A timely filed terminal disclaimer in compliance with 37 CFR 1.321(c) or 1.321(d) may be used to overcome an actual or provisional rejection based on a nonstatutory double patenting ground provided the conflicting application or patent either is shown to be commonly owned with this application, or claims an invention made as a result of activities undertaken within the scope of a joint research agreement.

Effective January 1, 1994, a registered attorney or agent of record may sign a terminal disclaimer. A terminal disclaimer signed by the assignee must fully comply with 37 CFR 3.73(b).

9. Claims 1 – 8, 10, 18 – 23, and 26 – 27 are rejected on the ground of nonstatutory obviousness-type double patenting as being unpatentable over claims 1 – 5, 7 – 11, 13 – 16, 19 – 20, and 24 of U.S. Patent No. 5,779,761 for the reasons discussed in the December 11, 2007 Office action.

10. Claims 1 – 3, 6, 18, 21, 23, 26, and 27 are provisionally rejected on the ground of nonstatutory obviousness-type double patenting as being unpatentable over claims 1 and 28 of copending Application No. 10/530,775 for the reasons discussed in the December 11, 2007 Office action.

This is a provisional obviousness-type double patenting rejection because the conflicting claims have not in fact been patented.

Response to Arguments

11. Applicant's arguments filed March 10, 2008 have been fully considered but they are not persuasive.

Arguments are summarized as follows:

- a. Instant claim 1 requires that the reductant metal be "...present in less than or equal to the amount needed to reduce the halide vapor to the elemental material or alloy..." whereas US '106 teaches an excess over the stoichiometric amount of reducing metal and therefore teaches directly away from claim 1.
- b. US '341 is directly opposite to the present invention since the reaction products disclosed are all in a molten state whereas the reaction products of the present invention require that "...the particulate elemental material or alloy remain unsintered..."
- c. The obviousness-type double patenting rejection over US 5,779,761 cannot stand because US '761 teaches an excess over the stoichiometric amount of reducing metal and therefore teaches directly away from claim 1.
- d. The provisional obviousness-type double patenting rejection over Application No. 10/530,775 cannot function because Application No. 10/530,775 teaches away from the instant application because it teaches an excess over the stoichiometric amount of reducing metal and therefore teaches directly away from claim 1.

Examiner's responses are as follows:

a. – b. See U.S.C. 103(a) rejection above.

c – d. The amount of liquid phase of reducing metal is a result effective variable.

It would have been obvious to one of ordinary skill in the art to optimize the amount of liquid phase of reducing metal through routine experimentation in order to achieve the desired particle size or reaction rate. See MPEP 2144.05 II.

Conclusion

12. Any inquiry concerning this communication or earlier communications from the examiner should be directed to CAITLIN FOGARTY whose telephone number is (571)270-3589. The examiner can normally be reached on Monday - Friday 8:00 AM - 5:30 PM EST.

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Roy King can be reached on (571) 272-1244. The fax phone number for the organization where this application or proceeding is assigned is 571-273-8300.

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Information regarding the status of an application may be obtained from the Patent Application Information Retrieval (PAIR) system. Status information for published applications may be obtained from either Private PAIR or Public PAIR. Status information for unpublished applications is available through Private PAIR only. For more information about the PAIR system, see <http://pair-direct.uspto.gov>. Should you have questions on access to the Private PAIR system, contact the Electronic Business Center (EBC) at 866-217-9197 (toll-free). If you would like assistance from a USPTO Customer Service Representative or access to the automated information system, call 800-786-9199 (IN USA OR CANADA) or 571-272-1000.

/Roy King/
Supervisory Patent Examiner, Art
Unit 1793

CF